CLAIMS

I claim:

1. A method of simultaneously genotyping multiple samples, the method comprising:

amplifying genomic segments from a plurality of samples using polymerase chain reaction primers, each genomic segment comprising a genetic locus;

forming a microarray on a surface wherein material at each location on the surface corresponds essentially to a single genomic segment from a single sample;

hybridizing the microarray with a mixture of synthetic oligonucleotides, wherein the mixture comprises oligonucleotides complementary to the genomic segments; and

deriving genotyping information for multiple samples simultaneously by detecting signals from the hybridized microarray.

2. The method of Claim 1 wherein the polymerase chain reaction primers comprise a plurality of distinct polymerase chain reaction primers such that the genomic segments comprise distinct genetic loci and genotyping information is derived simultaneously for multiple genetic loci from multiple samples.

3. The method of Claim 1 wherein the plurality of samples comprises at least 10 distinct samples.

4. The method of Claim 3 wherein the plurality of samples comprises at least 5,000 distinct samples.

5. The method of Claim 1 wherein the genomic segments comprise human disease loci.

6. The method of Claim 5 wherein the samples are neonatal blood samples.

7. The method of Claim 5 wherein the genetic loci comprise genetic loci associated with a human gene selected from the group consisting of β-globin, CFTR, and GALT.

8. The method of Claim 1 wherein the density of the microarray on the surface is at least 1000 spots per square centimeter.

9. The method of Claim 1 wherein the mixture of synthetic oligonucleotides comprises ten different oligonucleotide sequences.

10. The method of Claim 1 wherein the synthetic oligonucleotides are between about 10 and about 30 nucleotides in length.

11. The method of Claim 1 wherein the genomic segments each comprise between about 40 and about 1000 base pairs.

12. The method of Claim 1 wherein hybridizing is performed in an aqueous solutions comprising salts and detergent.

13. The method of Claim 1 wherein hybridizing is performed at a temperature about 10 °C below the melting temperature of the synthetic oligonucleotides.

14. The method of Claim 1 wherein the synthetic oligonucleotides comprise fluorescent labels.

15. The method of Claim 1 wherein the synthetic oligonucleotides comprise non-fluorescent labels.

16. The method of Claim 1 wherein the genotyping information distinguishes samples from homozygotes and samples from heterozygotes at a specific genetic locus.

17. The method of Claim 14 wherein the signals are generated by fluorescence emission from the labeled oligonucleotides.

18. The method of Claim 14 wherein the signals are generated by fluorescence emission at more than one wavelength of light.

19. The method of Claim 15 wherein the signals are generated by fluorescence emission after antibody staining.

20. The method of Claim 15 wherein the signals are generated by fluorescence emission at more than one wavelength of light after antibody staining.

21. The method of Claim 1 wherein the surface comprises glass.

22. The method of Claim 1 wherein the amplified genomic segments comprise amino linkers.

23. The method of Claim 22 wherein the surface comprises reactive aldehyde groups.

24. The method of Claim 1 wherein the microarray is formed by mechanical micro-spotting.